


A Skylighting Update


for COMMERCIAL Buildings

American Architectural Manufacturers Association

Presented by


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Current HMG Skylight Projects

- CEC Public Interest Energy Research
 - Skylight testing
 - Ceiling Integration
 - Productivity Follow on
 - New Productivity Studies
- Sky Lighting Guidelines training seminars
- Coalition for High Performance Schools - CHPS
- Photocontrol field research
- Skylighting in Energy Codes




Optimistic Signs

- Daylighting in schools is a hot national topic
- More retailers exploring skylight designs
- More researchers interested in daylighting
- SkyCalc has national audience, spreading by word of mouth
- CA rolling blackout emphasize importance of daylight



Pessimistic Signs

- Energy crises emphasis on generation, not conservation
- Photocontrols not “persistent”
- ASHRAE removed daylighting control requirements and reduced skylight areas
- IECC and ComCheck EZ limit skylights
 - *code officials will not accept skylights until we can prove demand reductions and photocontrol persistence*





Knowhow brochures

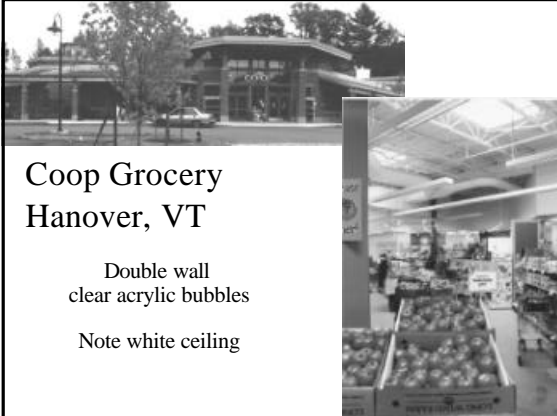
- Design Lights Consortium in NE
 - 8 page “how to” format
 - very condensed info, “Haiku”
- Retail and Warehouse Skylighting completed
- Schools and Office Daylighting planned
 - by others? Sidelighting only?
- Additional copies can be ordered, for a fee, from www.designlights.org

US Post Office, Nashua NH

- Double wall poly carbonate pyramids



- Note white ceiling and floor



**Coop Grocery
Hanover, VT**

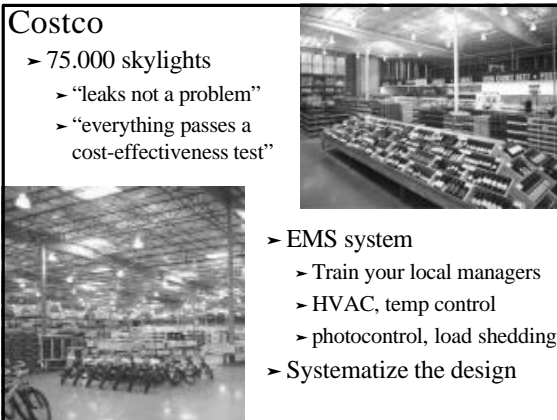
Double wall
clear acrylic bubbles

Note white ceiling




Costco

- Membership Warehouse Stores
- 240 stores in US, 335 Worldwide
- Skylighting and Photocontrols
- have been the corporate standard since 1985




Costco

- 75,000 skylights
 - "leaks not a problem"
 - "everything passes a cost-effectiveness test"
- EMS system
 - Train your local managers
 - HVAC, temp control
 - photocontrol, load shedding
- Systematize the design




Daylight Availability

<ul style="list-style-type: none"> ➤ Sidelighting <ul style="list-style-type: none"> ➤ 25% of existing commercial floor space ➤ 20% - 40% savings possible ➤ 5% to 10% impact on lighting energy use "maximum technical potential" 	<ul style="list-style-type: none"> ➤ Toplighting <ul style="list-style-type: none"> ➤ 60% of existing ➤ 90% of new ➤ 50% - 80% savings possible ➤ 30% to 70% impact on lighting energy use ➤ I.e. 6x to 7x bigger
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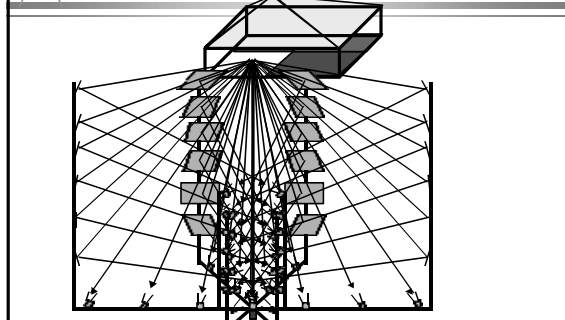


Photometric Testing Progress

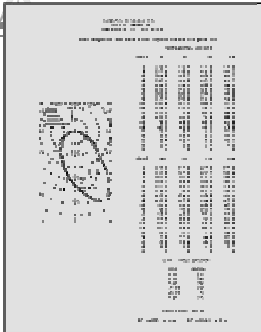
- 22 Skylights/Light well combinations tested under clear skies
 - Results for every 10° of solar elevation
- Variety of skylight shapes
 - Dome, pyramidal and compound parabolic
- Variety of glazing types/colors
 - White, bronze, prismatic, twinwall, fiberglass insulating panel



Goniophotometry



Photometric reports

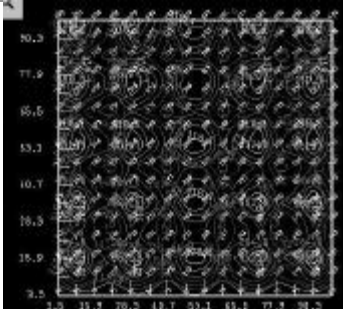


- Same specification as electric lighting
- Polar plots - shape of light distribution
- Spacing criterion
- Coefficients of Utilization


Skylight IES Photometric Files

- Compatible with all lighting software
- Prediction tools for
 - Light distribution - isolux graphs
 - Visualization
- Design tool for
 - Skylight specification and spacing
 - Compatible electric lighting lay-out

Isolux (Iso-footcandle) Contours



Lighting Visualization



Skylight Photometry Outreach

- All the PIER information is public domain and freely available
- Who needs to see this information?
- What is the best way to distribute it?


Skylights are a Lighting Product!

- Photometrics are the language of lighting designers!
- Lighting Sciences can test more skylights for photometrics
- Free lighting training for your sales staff through EDR Lights


www.energydesignresources.com

Advanced Lighting Guidelines 2001

- The definitive source on how to achieve good lighting,
- Advanced Lighting Guidelines is now available on the internet in a downloadable 'pdf' format from:
www.newbuildings.org/guide.htm



Advanced Lighting Guidelines Big Box Store w/Daylighting



- Daylighting: double glazed, high transmission (74%), diffusing skylights over open areas
- Electric lighting:
 - 100W MH industrial-style downlights on photocontrols and 1-lamp continuous row F59T8 aisle lights on photocontrols
 - 100W MH track floodlights for display highlighting
 - 2-lamp continuous row F32T8 luminaires for low display area
 - dual 40W T-5 twin tube floodlights in store window on adaptation compensation control
 - 42W CFL pendants for boutique area.

Ref: © Advanced Lighting Guidelines 2001

PIER Productivity Research

- Re-analysis of schools data completed
- New Retail Study - time of day issues
- New school sites started. Ventilation issues
- Manufacturing sites - we need leads!
 - Study is confidential similar to retailer study

Skylighting Potential Value

- 25% - 50% Energy Savings
 - Lighting Energy \$0.15 to \$0.75/ SF
 - Net Building \$0.10 to \$0.60/ SF
- 1% - 2% Productivity Savings
 - Office Labor \$1.50 to \$8.00/ SF
 - Retail Sales \$2.00 to \$15.00/ SF
- U.S. Green Buildings Council Manual
 - Lighting Energy Reduction By 50%-80%
 - Increase Workers Productivity by 15%


These rough values vary dramatically by climate, bldg. type, and energy costs

Code Barriers


- IECC and ComCheck EZ set maximum at 3% SFR
- ASHRAE removed daylighting credits
- No progress until:
 - we can prove demand savings
 - we can prove photocontrol persistence

CA Energy Code Proposals


- Review of "daylit zone"
- Requirement for automatic controls
- Review of control credits
 - Much more credit given dimming than on/off
- Requirement for skylights in certain large single story buildings
 - warehouses, big box retail, etc.

WA Energy Code

- Key Seattle City Code developer considering skylight requirement for some building types
- Washington State often adopts Seattle amendments in next code cycle
- Interaction between CA Title 24 and WA NREC

We need your input

- Feedback on the CA code proposals
 - Technical - photocontrol specification requirements? Best bldg. types to target?
 - Feasibility - can the market deliver?
 - Political - what trade-offs are needed?
- Costing of installed skylight systems
- Leads to architects or builders of skylit projects

Opportunities for you

- Get involved in code process(es)
- CA Code for 2005 is essentially started this spring and completed this summer.
- Collect stories of daylit buildings
- Lobby state and federal agencies on value of daylight. Need to support research